41. No. We'd expect her to hit the bull's-eye with 10 of the 50 arrows, with a standard deviation of 2.83 but she got 15 (is that 2 standard deviations above the mean. Good shooting, but probably not unusual for her.

PART IV REVIEW

1. a) 0.34 b) 0.27 c) 0.069
   d) No, 2% of cars have both types of defects.
   e) Of all cars with cosmetic defects, 6.9% have functional defects. Overall, 7.0% of cars have functional defects. The probabilities here are estimates, so these are probably close enough to say the defects are independent.
2. a) i) 0.60 ii) 0.90 iii) 0.615 iv) 0.80
   b) No. Fewer than half of the managers are female, but 60% of all workers are female.
3. a) C = Price to China; F = Price to France; Total = $3C + 5F$
   b) $\mu = \$5500, \sigma = \$672.68$ c) $\mu = \$500, \sigma = \$180.28$
   d) Means—no. Standard deviations—yes; ticket prices must be independent of each other for different countries, but all tickets to the same country are at the same price.
4. $np = 100 \geq 10$ and $nq = 9900 \geq 10$, so Success/Failure Condition is verified. Also, we assume that cases are independent. $\mu = 100, \sigma = 9.95$. Over 200 would be more than 10 SDs above the mean. Probability is essentially 0.
5. a) $\mu = -\$0.20, \sigma = \$1.89$ b) $\mu = -\$0.40, \sigma = \$2.67$
6. a) 3%
   b) No; 62% of those who can do it with their right hand can do it with their left, but 83.3% of those who can't do it with their right hand can do it with their left.
   c) No; 51% can use either hand.
7. a) 0.106 b) 0.651 c) 0.442
8. Expected (extra) cost of the cheaper policy with the deductible is $2.50, much less than the $12 for the no-deductible surcharge, so on average, she will save money by going with the deductible. But the standard deviation ($35.27) is evidence of risk. Value of the car shouldn't influence the decision.
9. a) 0.590 b) 0.328 c) 0.00856
10. a) $\mu = 6.775, \sigma = 2.60$ b) No, since $np = 6.78 < 10$
11. a) $\mu = 15.2, \sigma = 3.70$ b) Yes, $np \geq 10$ and $nq \geq 10$
    c) Normal, approx.: 0.080; Binomial, exact: 0.097
12. a)

Spaces	5	10	20
P(Spaces)	0.5	0.25	0.25

    b) $\mu = 10, \sigma = 6.12$
    c)

Spaces	0	1	2	3	4
P(Spaces)	1/3	1/6	1/6	1/6	1/6

    d) $\mu = 1.67, \sigma = 1.49$ e) $\mu = 11.67, \sigma = 6.30$
13. a) 0.0173 b) 0.591
    c) Left: 960; right: 120; both: 120
    d) $\mu = 120, \sigma = 10.39$
    e) About 68% chance of between 110 and 130; about 95% between 99 and 141; about 99.7% between 89 and 151.
14. $\mu = 8.33, \sigma = 6.30$
15. a) Men's heights are more variable than women's.
    b) Men (1.75 SD vs 2.4 SD for women)
    c) M = Man's height; W = Woman's height; $M - W$ is how much taller the man is.
    d) 5.1" e) 3.75" f) 0.913
    g) If independent, it should be about 91.3%. We are told 92%. This difference seems small and may be due to natural sampling variability.
16. a) 0.389 b) 0.284 c) 0.793 d) 0.896
17. a) The chance is 1.6×10^{-7}. b) 0.952 c) 0.063
18. a) No, this does not confirm the advice. If you follow the advice, it seems there's only a 75% chance it goes up in the 3rd year.
    b) It actually has risen in 73% of all years. Not much difference from their strategy.
19. $240
20. a) 0.240 b) 0.050 c) 0.383
21. a) 0.717 b) 0.588
22. a) 36 b) 5.02
    c) Because both $np = 36 \geq 10$ and $nq = 84 \geq 10$.
    d) There is a 68% chance between 30.98 and 41.02 (31 and 41 students); 95% chance between 25.96 and 46.04 (26 and 46 students); 99.7% chance between 20.94 and 51.06 (21 and 51 students).
23. a) $\mu = 100, \sigma = 8$ b) $\mu = 1000, \sigma = 60$
    c) $\mu = 100, \sigma = 8.54$ d) $\mu = -50, \sigma = 10$
    e) $\mu = 100, \sigma = 11.31$
24. Assuming policies are independent, we add the profit variances. The resulting standard deviation of total profit is less than the sum of the SDs of individual profits. This means the profit for the large company will be less variable than the total of profits for the smaller companies.
25. a) Many do both, so the two categories can total more than 100%.
    b) No. They can't be disjoint. If they were, the total would be 100% or less.
    c) No. Probabilities are different for boys and girls.
    d) 0.0524
26. a) $\mu = \$27.00, \sigma = \$9.90$
    b) Spending on different days is independent. This might not be reasonable, since a student may be more likely to spend less on a day after he had spent a lot.
    c) $\mu = \$94.50, \sigma = \$18.52$
    d) No. $50 is 2.4 SDs below the mean. We assumed independence of costs each day.
27. a) 21 days b) 1649.73 som
    c) 3300 som extra. About 157-som "cushion" each day.
28. a) 4 lb b) 3.20 lb c) 0.894
29. No, you'd expect 541.2 homeowners, with an SD of 13.56. 523 is 1.34 SDs below the mean; not unusual.
30. $\mu = \$2.54, \sigma = \$0.94$
31. a) 0.018 b) 0.300 c) 0.26
32. a) 0.0156 b) 0.0039
    c) Answer b would become 0.0026.
33. a) 6 b) 15 c) 0.402
34. a) 3
    b) Expect to lose 1/6 of your current score. c) 18
    d) Roll until you score 18 points, then stop.
35. a) 34% b) 35% c) 31.4%
    d) 31.4% of classes that used calculators used computer assignments, while in classes that didn't use calculators, 30.6% used computer assignments. These are close enough to think the choice is probably independent.
36. a) 0.5929 b) 0.407 c) 0.053 d) 0.0025
37. a) 1/11 b) 7/22 c) 5/11 d) 0 e) 19/66
38. a) $\mu = 18, \sigma = 3$ b) 6 c) No, σ is now 5. d) 10 or more
    e) What appears "surprising" in the short run becomes expected in a large number of trials.
39. a) Expected number of stars with planets.
    b) Expected number of planets with intelligent life.
    c) Probability of a planet with a suitable environment having intelligent life.
    d) f_l: If a planet has a suitable environment, the probability that life develops.
    f_i: If a planet develops life, the probability that the life evolves intelligence.
    f_c: If a planet has intelligent life, the probability that it develops radio communication.
40. a) 0.017 b) 0.824 **41.** 0.991
42. a) 0.01 b) 0.0098 c) 0.366 d) First
    e) The chance of winning is 0.01 anywhere in line, so position does not matter.